ORIGINAL

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Warren Woodward
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BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS
DOUG LITTLE, CHAIRMAN
BOB BURNS
TOM FORESE
BOB STUMP
ANDY TOBIN

IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR A HEARING TO DETERMINE THE FAIR VALUE OF THE UTILITY PROPERTY OF THE COMPANY FOR RATEMAKING PURPOSES, TO FIX A JUST AND REASONABLE RATE OF RETURN THEREON, TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP SUCH RETURN.	DOCKET # E-01345A-16-0036 **MOTION TO COMPEL APS TO FULLY ANSWER DATA REQUESTS**
IN THE MATTER OF FUEL AND PURCHASED POWER PROCUREMENT AUDITS FOR ARIZONA PUBLIC SERVICE COMPANY	DOCKET # E-01345A-16-0123

Warren Woodward ("Woodward"), Intervenor in the above proceeding, hereby requests the Arizona Corporation Commission ("ACC") to compel Arizona Public

Service Company ("APS") to comply with ACC Decision # 75047 and to fully answer Woodward's data requests made in the above proceeding.

On December 15, 2016, APS responded to Woodward's second set of data requests. Woodward was denied an answer to many of his questions because APS deemed the questions "irrelevant," "overly broad," "unduly burdensome," &/or "moot,"

On December 15, 2016, Woodward telephoned Kerri A. Carnes, Manager of State Regulation and Compliance at APS, and attempted to resolve the issue by explaining that, according to Findings of Fact ## 16 & 17 of ACC Decision # 75047 (Exhibit A), the questions were in fact relevant and that APS was bound to answer them. Kerri A. Carnes said that on the following day she would take the issue up with the APS "Rate Case Team."

On December 19, 2016, Woodward received a telephone call from APS attorney Thomas Mumaw. Thomas Mumaw informed Woodward that APS was not changing its position that APS would not answer the questions.

Findings of Fact ## 16 & 17 of ACC Decision # 75047 state:

> 16. The issues presented by APS's proposed opt-out tariff have attracted significant public attention. The comments that we have received from the public show that some individuals continue to be concerned about the various issues that may surround smart meters.
> 17. Although APS has presented its application as a tariff filing, we think that these issues would benefit from the type of comprehensive review that is conducted in a general rate case. A tariff filing proceeding, which is typically processed in a more abbreviated fashion, is ill-suited to address the issues presented herein.

Woodward, via his data requests, is attempting to conduct the "comprehensive review" that "the various issues that may surround smart meters" "would benefit from." Woodward's data requests comport with ACC Decision # 75047. See Exhibit B for a question by question evaluation.

APS's stonewalling is not in compliance with ACC Decision # 75047. APS must be compelled to answer Woodward's data requests listed in Exhibit B.

In addition, Woodward requests that, upon getting the answers he was denied, he be allowed to amend his previously filed Direct Testimony with an Addendum that would include the subject matter and issues of the data requests to which he was denied answers.

RESPECTFULLY SUBMITTED this 27th day of December, 2016.

By 

Warren Woodward
200 Sierra Road
Sedona, Arizona 86336

Original and 13 copies of the foregoing hand delivered on this 27th day of December, 2016 to:

Arizona Corporation Commission
Docket Control
1200 West Washington Street
Phoenix, Arizona 85007

Copies of the foregoing mailed/e-mailed this 27th day of December, 2016 to:

Service List

EXHIBIT A

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0000160782

BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS

SUSAN BITTER SMITH, CHAIRMAN
BOB STUMP
BOB BURNS
DOUG LITTLE
TOM FORESE

Arizona Corporation Commission
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IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR APPROVAL OF AUTOMATED METER OPT-OUT SERVICE SCHEDULE 17.

DOCKET NO. E-01345A-13-0069

DECISION NO. 75047

ORDER ON REHEARING GRANTING INTERLOCUTORY RELIEF AND RESCINDING DECISION NO. 74871

Open Meeting
April 13, 2015

BY THE COMMISSION:

FINDINGS OF FACT

1. Arizona Public Service Company ("APS" or "Company") is certificated to provide electric service as a public service corporation in the State of Arizona.

2. On March 22, 2013, APS filed an application requesting approval of a proposed Automated Meter Opt-Out Service Schedule. APS reports that it has now almost completely deployed Advanced Metering Infrastructure ("AMI")—often referred to as "smart meters"—in its service territory.

3. Several groups of APS customers have raised concerns about the health effects of smart meters. These customers have requested the ability to retain non-transmitting analog meters, and APS's proposed opt-out schedule is intended to recover the costs of retaining analog meters for those customers.

4. In its proposed opt-out tariff, APS proposed two charges for customers who choose to opt-out of AMI metering. Those charges included a one-time $75.00 initial "set-up" charge and a recurring monthly meter-reading charge of $30.00. The Company subsequently provided updated cost estimates for a lower monthly fee of $21.00.

5. After the Company filed its application, the Commission received numerous filings in opposition to the tariff from members of the public.

6. Among the comments were allegations that smart meters adversely affect human health, that smart meters intrude upon individual privacy interests, that the costs of smart meter deployment do not outweigh the benefits, and that APS's proposed opt-out tariff rate is unreasonable.

7. In a related proceeding (Docket No. E-00000C-11-0328), we considered the issues related to smart meters in a generic setting. In conjunction with those efforts, we asked the Arizona Department of Health Services ("ADHS") to conduct a study regarding the potential health effects of smart meters.

8. ADHS's study was filed in Docket No. E-00000C-11-0328 on November 4, 2014.

9. The study involved a sampling of smart meters to determine if the meters were operating within the parameters set by the Federal Communications Commission ("FCC"). ADHS's study confirmed that the meters tested were operating within the FCC standard.

10. On December 12, 2014, we considered APS's opt-out tariff proposal at an open meeting. At that time, we heard public comment as well as argument from the parties. Interveners Warren Woodward and Patricia Ferre opposed APS's opt-out proposal.

11. On December 18, 2014, we issued Decision No. 74871. In that decision, we took judicial notice of the ADHS study. We also approved a modified opt-out tariff for APS. Finally, we decided to submit the records of both this proceeding and of Docket No. E-00000C-11-0328 to the FCC in order to provide that agency with the information that has been presented to us.

12. In Decision No. 74871, we reduced the proposed initial set-up fee to $50.00; however, we limited this fee to those customers who already have a smart meter in place. Customers who currently have analog meters would not be subject to a set-up fee. In addition, we reduced the monthly fee from $21.00 (as proposed by APS) to $5.00.

13. Interveners Woodward and Ferre timely filed separate Applications for Rehearing pursuant to A.R.S. § 40-253.

14. On January 22, 2015, we granted both applications for rehearing for the limited purpose of further consideration.

15. We subsequently considered this matter at open meetings in March and April.

16. The issues presented by APS's proposed opt-out tariff have attracted significant public attention. The comments that we have received from the public show that some individuals continue to be concerned about the various issues that may surround smart meters.

17. Although APS has presented its application as a tariff filing, we think that these issues would benefit from the type of comprehensive review that is conducted in a general rate case. A tariff filing proceeding, which is typically processed in a more abbreviated fashion, is ill-suited to address the issues presented herein.

18. It is our understanding that APS intends to file a general rate case within the next 18-24 months. We note that, pursuant to our decision in APS's last rate case, the Company may file its next general rate case as soon as June of 2015.

19. We believe that our consideration of this matter will be aided by the full spectrum of information that is included in a general rate case. We will therefore stay this proceeding until APS files its next general rate case, at which time the two cases may be consolidated or processed in tandum.

20. Pursuant to A.R.S. § 40-253(E), we specifically rescind and abrogate Decision No. 74871 at this time.

21. In the interim, APS should continue to provide analog meters to those customers who ask for them.

22. We will also require APS to track the unrecovered costs of its continued provision of analog meters, including the costs of such meters, the costs of meter reading, and any other costs attributable to providing customers with analog meters. APS may defer those unrecovered costs, and may request recovery of any reasonable and prudent unrecovered costs in its next rate case.

23. Also in its next general rate case, APS shall provide the following information in order to assist us with our evaluation of these issues:

a. The total number of APS customers who have elected to be served with analog meters in the test year;

b. A breakdown by county of the number of APS customers who have elected to be served with analog meters in the test year;

c. The average per-customer, test-year costs of providing service with an analog meter as compared to the average per-customer, test-year costs of providing service with a smart meter;

d. The test-year costs and expenses attributable to allowing customers to receive service through an analog meter;

e. The estimated bill impacts of spreading the cost recovery of an opt-out program across all APS customer classes;

f. The estimated bill impacts of confining the cost recovery of an opt-out program to those customers who elect to forego an AMI meter;

g. The estimated bill impacts of spreading the cost recovery of an opt-out program across all residential customers; and

h. A comparative analysis of the costs and benefits of smart meters as opposed to the costs and benefits of analog meters.

23. Our action in this matter is taken without prejudice to APS and to the parties to pursue these matters in APS's next rate case, and without prejudice to Mr. Woodward to pursue his complaint in Docket No. E-01345A-14-0113.

24. This decision is not intended to foreclose any party from continuing to file pleadings or other information in this docket in the interim.

CONCLUSIONS OF LAW

1. APS is a public service corporation within the meaning of Article XV, Section 2 of the Arizona Constitution.

2. The Commission has jurisdiction over APS and over the subject matter of this case pursuant to Article XV of the Arizona Constitution and Title 40 of the Arizona Revised Statutes.

3. The Applications for Rehearing filed by Warren Woodward and Patricia Ferre are hereby granted, as discussed herein.

4. Decision No. 74871 is specifically rescinded and abrogated pursuant to A.R.S. § 40-253(E), and we hereby grant relief on an interlocutory basis, as discussed herein.

5. It is reasonable to allow APS to defer the reasonable and prudent unrecovered costs discussed in Finding of Fact No. 22 for possible recovery in its next rate case.

6. APS's Application in this docket is hereby stayed until the filing of APS's next general rate case.

ORDER

IT IS THEREFORE ORDERED that the Applications for Rehearing filed by Warren Woodward and Patricia Ferre are hereby granted, as discussed herein.

IT IS FURTHER ORDERED that Decision No. 74871 is specifically rescinded and abrogated pursuant to A.R.S. § 40-253(E), and relief is granted on an interlocutory basis, as discussed herein.

IT IS FURTHER ORDERED that APS may defer the reasonable and prudent unrecovered costs discussed in Finding of Fact No. 22 for possible recovery in its next rate case.

IT IS FURTHER ORDERED that APS's Application in this docket is hereby stayed until the filing of APS's next general rate case.

IT IS FURTHER ORDERED that this order shall take effect immediately.

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BY THE ORDER OF THE ARIZONA CORPORATION COMMISSION

CHAIRMAN COMMISSIONER

COMMISSIONER COMMISSIONER COMMISSIONER

IN WITNESS WHEREOF, I, JODI JERICH, Executive Director of the Arizona Corporation Commission, have hereunto, set my hand and caused the official seal of this Commission to be affixed at the Capitol, in the City of Phoenix, this 30th day of April, 2015.

JODI JERICH
EXECUTIVE DIRECTOR

DISSENT: _____

DISSENT: _____

SERVICE LIST FOR: ARIZONA PUBLIC SERVICE COMPANY
DOCKET NO. E-01345A-13-0069

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EXHIBIT B

The following questions 2.1 to 2.8 are relevant to the APS rate case because they relate to the health harm issue of "smart" meters. Additionally, over the years APS has lied repeatedly about the transmissions of its "smart" meters. At the ACC March 23, 2012 "smart" meter workshop meeting, APS went on record as saying its "smart" meters broadcast once every 15 minutes and an additional 14 times throughout the day (for a total of 110 times per day). The APS employee is seen stating that at 5:08 pm in the video minutes. Later, on June 20, 2014 and posted to ACC Docket #E-01345A-13-0069 by (former) ACC commissioner Brenda Burns, APS, in a series of answers to questions, stated its "smart" meters transmit 122 times per day if a "node" meter, and 125 times per day if a "gateway" meter. Woodward, however, proved in his YouTube video, *APS Caught Lying Again*, that numbers like 110, 122 and 125 are not at all correct. In Woodward's video, in just a minute and a half of measuring, an APS "smart" meter is seen transmitting 53 times. At that rate, the daily total of microwave transmissions is 50,880. Utility lying about "smart" meter transmissions is commonplace. For example, like APS, California's PG&E was also drastically understating the number of its "smart" meters' microwave transmissions. Depending on who was talking at PG&E, PG&E "smart" meters transmitted 4 or 6 times per day – until PG&E went under oath. Then PG&E admitted its "smart" meters actually transmit from 9,600 to as many as 190,000 times per day (see Exhibit C). And after pressure from concerned citizens, Sacramento Municipal Utility District revised their 'only 6 times per day' "smart" meter transmission story to as many as 240,396 transmissions per day! (Exhibit D) APS ratepayers deserve to know the truth about APS's "smart" meters, and Woodward, per ACC Decision # 75047, is entitled to conduct the "comprehensive review" of "the various issues that may surround smart meters." APS must answer questions 2.1 to 2.8 *in full.* The questions, by the way, are modeled on the ones the California Public Utilities Commission Administrative Law Judge asked PG&E (as seen in Exhibit C).

Woodward
2.1:
How many times in total (minimum, maximum and average) is an APS node "smart" meter scheduled to transmit during a 24 hour period? Provide transmissions by message type (such as for example those for Meter Read Data, Network Management, Time Synch, Mesh Network Message Management), and provide definitions of message types. If different by manufacturer brand of meter, then provide for each brand of "smart" meter that APS uses.

Response: The number and types of transmissions in a 24-hour period are not relevant to any matters at issue in APS's pending rate case. Accordingly, APS objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence.

In addition, the Arizona Corporation Commission (ACC) spent three

years performing an inquiry in Docket No. E-00000C-11-0328 regarding the health, safety and functionality of advanced meters (also sometimes referred to as "smart meters"). The ACC commissioned the Arizona Department of Health Services to conduct a study regarding advanced meters. That study concluded that the advanced meters in use in Arizona (by APS and others) met and were operating within the Federal Communications Commission's standards and were not likely to harm public health. See ADHS report docketed November 4, 2014 in Docket No. E-00000C-11-0328 and Commission Findings of Fact 7 through 9 in Decision No. 75047 in Docket No. E-01345A-13-0069.

Woodward
2.2:
Under what scenarios and how often does a node meter transmit outside of the daily schedule, i.e., unscheduled transmission such as on-demand read, tamper/theft alert, last gasp, firmware upgrade etc.?

Response: Meter transmissions are not relevant to any matters at issue in APS's pending rate case. Accordingly, APS objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence.

In addition, the Arizona Corporation Commission (ACC) spent three years performing an inquiry in Docket No. E-00000C-11-0328 regarding the health, safety and functionality of advanced meters (also sometimes referred to as "smart meters"). The ACC commissioned the Arizona Department of Health Services to conduct a study regarding advanced meters. That study concluded that the advanced meters in use in Arizona (by APS and others) met and were operating within the Federal Communications Commission's standards and were not likely to harm public health. See ADHS report docketed November 4, 2014 in Docket No. E-00000C-11-0328 and Commission Findings of Fact 7 through 9 in Decision No. 75047 in Docket No. E-01345A-13-0069.

Woodward
2.3:
Are there any other factors that go into determining duration and/or amount of node meter transmissions (e.g., if a meter can't access the network when it's trying to send data, type of a meter etc.)? If yes, then identify those factors.

Response: The number and duration of meter transmissions are not relevant to any matters at issue in APS's pending rate case. Accordingly, APS

objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence.

In addition, the Arizona Corporation Commission (ACC) spent three years performing an inquiry in Docket No. E-00000C-11-0328 regarding the health, safety and functionality of advanced meters (also sometimes referred to as "smart meters"). The ACC commissioned the Arizona Department of Health Services to conduct a study regarding advanced meters. That study concluded that the advanced meters in use in Arizona (by APS and others) met and were operating within the Federal Communications Commission's standards and were not likely to harm public health. See ADHS report docketed November 4, 2014 in Docket No. E-00000C-11-0328 and Commission Findings of Fact 7 through 9 in Decision No. 75047 in Docket No. E-01345A-13-0069.

Woodward
2.4:
How many times in total (minimum, maximum and average) is an APS gateway "smart" meter scheduled to transmit during a 24 hour period? Provide transmissions by message type (such as for example those for Meter Read Data, Network Management, Time Synch, Mesh Network Message Management) and provide definitions of message types. If different by manufacturer brand of meter, then provide for each brand of meter that APS uses.

Response: The number and types of transmissions in a 24-hour period are not relevant to any matters at issue in APS's pending rate case. Accordingly, APS objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence.

In addition, the Arizona Corporation Commission (ACC) spent three years performing an inquiry in Docket No. E-00000C-11-0328 regarding the health, safety and functionality of advanced meters (also sometimes referred to as "smart meters"). The ACC commissioned the Arizona Department of Health Services to conduct a study regarding advanced meters. That study concluded that the advanced meters in use in Arizona (by APS and others) met and were operating within the Federal Communications Commission's standards and were not likely to harm public health. See ADHS report docketed November 4, 2014 in Docket No. E-00000C-11-0328 and Commission Findings of Fact 7 through 9 in Decision No. 75047 in Docket No. E-01345A-13-0069.

Woodward
2.5:

Under what scenarios and how often does a gateway meter transmit outside of the daily schedule, i.e., unscheduled transmission such as on-demand read, tamper/theft alert, last gasp, firmware upgrade etc.?

Response: The number and types of transmissions are not relevant to any matters at issue in APS's pending rate case. Accordingly, APS objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence.

In addition, the Arizona Corporation Commission (ACC) spent three years performing an inquiry in Docket No. E-00000C-11-0328 regarding the health, safety and functionality of advanced meters (also sometimes referred to as "smart meters"). The ACC commissioned the Arizona Department of Health Services to conduct a study regarding advanced meters. That study concluded that the advanced meters in use in Arizona (by APS and others) met and were operating within the Federal Communications Commission's standards and were not likely to harm public health. See ADHS report docketed November 4, 2014 in Docket No. E-00000C-11-0328 and Commission Findings of Fact 7 through 9 in Decision No. 75047 in Docket No. E-01345A-13-0069.

Woodward
2.6:
Are there any other factors that go into determining duration and/or amount of gateway meter transmissions (e.g., if a meter can't access the network when it's trying to send data, type of a meter etc.)? If yes, then identify those factors.

Response: The number and duration of transmissions are not relevant to any matters at issue in APS's pending rate case. Accordingly, APS objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence.

In addition, the Arizona Corporation Commission (ACC) spent three years performing an inquiry in Docket No. E-00000C-11-0328 regarding the health, safety and functionality of advanced meters (also sometimes referred to as "smart meters"). The ACC commissioned the Arizona Department of Health Services to conduct a study regarding advanced meters. That study concluded that the advanced meters in use in Arizona (by APS and others) met and were operating within the Federal Communications Commission's standards and were not likely to harm public health. See ADHS report docketed November 4, 2014 in Docket No. E-00000C-11-0328 and Commission Findings of Fact 7 through 9 in

Decision No. 75047 in Docket No. E-01345A-13-0069.

Woodward
2.7:
APS's new Landys & Gyr "smart" meters are Zigbee equipped. Are those meters installed with the Zigbee radio on or off? If on, how many times per day is the Zigbee transmitting? Breakout by type of transmission.

Response: The status of the ZigBee radio is not relevant to any matters at issue in APS's pending rate case. Accordingly, APS objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence.

In addition, the Arizona Corporation Commission (ACC) spent three years performing an inquiry in Docket No. E-00000C-11-0328 regarding the health, safety and functionality of advanced meters (also sometimes referred to as "smart meters"). The ACC commissioned the Arizona Department of Health Services to conduct a study regarding advanced meters. That study concluded that the advanced meters in use in Arizona (by APS and others) met and were operating within the Federal Communications Commission's standards and were not likely to harm public health. See ADHS report docketed November 4, 2014 in Docket No. E-00000C-11-0328 and Commission Findings of Fact 7 through 9 in Decision No. 75047 in Docket No. E-01345A-13-0069.

Woodward
2.8:
At one of the ACC "smart" meter workshop meetings, APS claimed to have tested and measured the microwave radiation of its "smart" meters in a Faraday room.

a. Describe exactly what tests were performed, what measurements were taken, what type "smart" meters were tested, whether a meter was tested in isolation or as part of mesh network, and if tests were performed to detect anything other than microwaves such as for example power quality. Provide any and all worksheets and notes involved (if performed by an outside vendor, provide reports).

b. Since Landis & Gyr brand "smart" meters were not being used at that time, were any similar tests performed by APS on the Landis & Gyr meters prior to their installation? If so, apply the same questions asked above in 8(a).

Response: AMI meter transmissions are not relevant to any matters at issue in APS's pending rate case. Accordingly, APS objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence.

In addition, the Arizona Corporation Commission (ACC) spent three years performing an inquiry in Docket No. E-00000C-11-0328 regarding the health, safety and functionality of advanced meters (also sometimes referred to as "smart meters"). The ACC commissioned the Arizona Department of Health Services to conduct a study regarding advanced meters. That study concluded that the advanced meters in use in Arizona (by APS and others) met and were operating within the Federal Communications Commission's standards and were not likely to harm public health. See ADHS report docketed November 4, 2014 in Docket No. E-00000C-11-0328 and Commission Findings of Fact 7 through 9 in Decision No. 75047 in Docket No. E-01345A-13-0069.

The following questions 2.14 & 2.15 are relevant to the APS rate case because they relate to the fire issue of "smart" meters. APS has not been forthcoming about this issue, and the ACC never conducted a thorough investigation despite being told of fires and despite APS admitting there had been "some" fires in its service territory. APS ratepayers deserve to know the truth about APS's "smart" meters, and Woodward, per ACC Decision # 75047, is entitled to conduct the "comprehensive review" of "the various issues that may surround smart meters."

Woodward
2.14:
Here is another ACC question and APS response from the ACC's 2014 investigation mentioned above in question # 13:

> 3. Has APS experienced any house fires that are attributable to failures or flaws in meters installed as part of APS's AMI system? If so, please provide details.
>
> No. There have been some fires within the APS service territory that were initially alleged to be caused by Elster meters. However, in these instances, a root cause external to the meter itself, such as broken or loose meter clips or defective wiring at the location, was determined to be the cause of the fire.

a) Exactly how many is "some fires?"
b) How many of the "some fires" described by APS above have there been in APS's service territory since APS began

installing "smart" meters?
c) Since fires were determined to be caused by factors external to the meter itself, "such as broken or loose meter clips or defective wiring at the location," was any consideration given by APS to customers' meter enclosures (such as age or type for ex,.) as part of APS's initial decision to install "smart" meters in the first place? If so, provide the meter enclosure inspection protocol that was adopted before APS's first "smart" meter was installed.
d) If in fact there was a meter enclosure inspection protocol adopted, explain why customers should be liable for meter clips that they cannot access to inspect and that worked fine until APS replaced their existing meter with a "smart" meter.

Response: The number of fires alleged to have been caused by AMI meters, and the protocols surrounding meter inspections, is not relevant to any matters at issue in APS's pending rate case. Accordingly, APS objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence.

Woodward
2.15:
In response to the same ACC question as the one in my question #14 above, APS also stated:

> Finally, an insurance company otherwise responsible for paying a claim on a house fire, has filed a lawsuit against APS and Elster, claiming that the Elster meter was the cause of the fire. Elster, APS, and their internal and external investigators, disagree with the insurance company's claim. To date, the insurance company's claim remains unsupported by any expert testimony.

a) How was the aforementioned lawsuit settled?
b) Has APS been named in any other "smart" meter fire related lawsuits?
c) If so, how many and what was their outcome?
d) Have the manufacturers of APS's "smart" meters been named in fire related lawsuits other than the one mentioned by APS above?
e) If so, how many and what was their outcome?
f) Were any changes made to APS's practices and processes as a result of any fire claims? If yes, describe.
g) Were there any changes (safety features) made to the meter design by the manufacturer as a result of any fire

claims in APS's service territory? If so, were any APS "smart" meters replaced with ones upgraded with those safety features?

Response: APS objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence. Notwithstanding this objections, please see APS's response to Pre-filed 1.49 and Staff 1.20.

The following question 2.21 relates directly to the cost of APS's "smart" grid and so should be answered by APS. The analog system needed no promotion, and so had no such expenses. The answer to the question is therefore relevant for comparison. The question is not "overly broad." APS should have the answers in its records. APS ratepayers deserve to know the truth about APS's "smart" meters, and Woodward, per ACC Decision # 75047, is entitled to conduct the "comprehensive review" of "the various issues that may surround smart meters."

Woodward
2.21:
a. Since APS began installing "smart" meters, how much has APS spent advertising and promoting those meters, and "educating" customers about them? Include all expenses such as consulting fees, printing, media buys, website changes and mailings.

b. Who bore the cost of the above expenses, ratepayers or shareholders?

Response: a. APS objects to this data request as overly broad. Notwithstanding this objection, APS has not spent any money on advertising or promoting its standard AMI meters during the Test Year. APS did historically maintain certain educational materials, such as content on the aps.com website, regarding advanced meters. However, APS incurred no incremental costs related to these efforts in the Test Year.

b. There are no costs to be recovered in this rate case. However, such costs could be eligible for recovery from customers in future proceedings.

The following question 2.22 is relevant for the same reason question 2.21 is relevant. The analog system needed no promotion, or industry friendly scientist to shill for it, and so had no such expenses. The answer to the question is therefore relevant for comparison. Additionally, it is well known that Leeka Kheifits is "in demand" as an "industry scientist." From Microwave News:

> Actually, Kheifets and Swanson's paper is worse than junk science, it's fraud. The paper seeks to give the electric industry a major prize by taking electric fields off the EMF health agenda. This is, by any reasonable definition, scientific misconduct, and is far more serious than any of the cases that have been pursued by those who police scientific integrity (see "Three Cases of Alleged Scientific Misconduct").
> **Far from ever being challenged, Kheifets has been and continues to be in great demand. She has helped shape every major EMF risk evaluation in recent memory.**
> (Exhibit E, *The Real Junk Science of EMFs: Stop Electric Field Cancer Research, Say Industry Scientists*, emphasis added)

Since Leeka Kheifets "has helped shape every major EMF risk evaluation in recent memory," and because she allegedly engages in fraud, any correspondence between Leeka Kheifets and APS is very relevant to the "smart" meter health harm issue. APS ratepayers deserve to know the truth about APS's "smart" meters, and Woodward, per ACC Decision # 75047, is entitled to conduct the "comprehensive review" of "the various issues that may surround smart meters."

Woodward
2.22:
How much did APS spend to have Leeka Kheifets attend the ACC "smart" meter workshop meeting at which she presented? Supply any and all correspondence between Leeka Kheifits and APS.

Response:
Any remuneration provided to Dr. Kheifets as a result of her presentation at the Commission's smart meter workshop in September of 2011 is not included in the Company's 2015 test year, and is therefore not relevant to any matters at issue in APS's pending rate case. Nor is any correspondence between APS and Dr. Kheifets relevant to matters at issue in this case. Accordingly, APS objects to this request as irrelevant and not likely to lead to the discovery of admissible evidence.

Woodward has shown the relevancy of the following question 2.32.c in his direct testimony at III.A, page 8. Note that while APS did not declare the question irrelevant, APS did avoid answering the question specifically. APS ratepayers deserve to know the truth about APS's "smart" meters, and Woodward, per ACC Decision # 75047, is entitled to conduct the "comprehensive review" of "the various issues that may surround smart meters."

Woodward
2.32.c:
What year did the company start offering dual language customer services?

Response:
c. APS has had bilingual employees for many years to assist non-English speaking customers.

Regarding the following question 2.36, if APS has a record of trouble tickets for the Test Year then APS has a record of trouble tickets for 2005. Thus Woodward does not accept the "unduly burdensome" excuse. The trouble tickets of 2005 are needed for a comparison between the analog system and the "smart" meter system. APS ratepayers deserve to know the truth about APS's "smart" meters, and Woodward, per ACC Decision # 75047, is entitled to conduct the "comprehensive review" of "the various issues that may surround smart meters."

Woodward
2.36:
a. How many residential meter trouble tickets were processed in 2005? List by type of trouble.

b. How many residential meter trouble tickets were processed in 2015? List by type of trouble.

Response: a. APS objects to this request as it seeks information that is not relevant to any issue pending in or likely to lead to the discovery of admissible evidence about the company's current rate case request. In addition, APS objects that this request is unduly burdensome because APS's system from this timeframe does not allow easy access to this information.

b. 6,229 meter trouble tickets were processed in 2015. Below is the breakdown by category.

Row Labels	Count of TROUBLE_TYPE
Customer Repairs	4,344
Exchange	613
Emergency Re-connect	96
Glass Broken	10
Meter/CT Damaged	30
New Meter	156
Non Pay Connect	206
Non Pay Disconnect	87

Re-energize Meter	375
Removed Meter	312
Grand Total	**6,229**

As Woodward wrote in his direct testimony, the following question 2.38 is *not* "moot."

> Actually it is not "moot" but highly relevant for two reasons. 1) It's important to know if APS's "smart" grid has met original cost/benefit projections. 2) It's important to know if cost/benefit projections were ever made at all since that was called for in the previously mentioned ACC Decision # 69736 (Exhibit W).
>
> I suspect a cost/benefit analysis was never done, which is why APS has avoided providing one, declaring the subject "moot" instead. I suspect one was never done because previously, in ACC Docket # E-01345A-13-0069, I caught APS doctoring language from Decision # 69736 that called for a cost/benefit analysis.
>
> ACC Docket # E-01345A-13-0069 was an application made by APS in March, 2013 for approval of an extortion fee for those customers who refused a "smart" meter. APS started out their application by selectively quoting – *and actually misquoting* – ACC Decision # 69736.
>
> APS wrote at page 2 of their application:
>
> > "In Decision No. 69736, as a result of deliberations on the requirements of the Energy Policy Act of 2005 and the Public Utility Regulatory Policy Act ("PURPA"), the Commission adopted a modified version of the PURPA time based metering and communication standards and directed that "**each electric distribution utility shall investigate advanced metering infrastructure for its service territory and shall begin implementing the technology** ...."
> > (Exhibit Z, p. 2, line 3, emphasis added)

Quite familiar with the 2007 Decision, I did not recall that quote so I read the Decision again ..... and again ..... and again ..... and finally on the fourth read I figured out why I could not find the quote and what APS had done. APS doctored the quote to suit its needs.

Here is the exact quote. What APS deleted is in **bold**. Anyone should be able to see how the meaning was changed by APS.

> "... each electric distribution utility shall investigate **the feasibility and cost-effectiveness of implementing** advanced metering infrastructure for its service territory and shall begin

implementing the technology **if feasible and cost effective.**" (Exact quote is at page 7, line 10, Exhibit W)

Significantly, APS also left out the Decision's previous sentence which mandates a voluntary, "opt in" style program. Note the phrase, "upon customer request."

> "Within 18 months of Commission adoption of this standard, each electric distribution utility shall offer to appropriate customer classes, and provide individual customers **upon customer request**, a time-based rate schedule under which the rate charged by the electric utility varies during different time periods and reflects the variance, if any, in the utility's costs of generating and purchasing electricity at the wholesale level." (Exhibit W, p. 7, line 7, emphasis added)

Because of the amount of schooling it takes to become a lawyer, I can only conclude that this doctoring of the ACC's Decision was done deliberately and not inadvertently. I think most people learned in high school that when a phrase is removed from a sentence it is supposed to be replaced with an ellipsis. I think most people also learned that if a phrase is essential to the meaning of a sentence then it should not be removed at all.

APS ratepayers deserve to know the truth about APS's "smart" meters, and Woodward, per ACC Decision # 75047, is entitled to conduct the "comprehensive review" of "the various issues that may surround smart meters."

Woodward
2.38:
Provide APS's original cost/benefit projections for APS's "smart" meter project before APS's first "smart" meter was installed.

Response: APS has been installing AMI meters for well over a decade with ACC knowledge and approval. In prior rate cases, APS has routinely sought and received cost recovery of all its meters, including its AMI meters. Thus, this issue is moot at this point.

EXHIBIT C

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Pacific Gas and Electric Company for Approval of Modifications to its SmartMeter™ Program and Increased Revenue Requirements to Recover the Costs of the Modifications (U 39 M)	Application 11-03-014 (Filed March 24, 2011) **(NOT CONSOLIDATED)**
Application of Utility Consumers' Action Network for Modification of Decision 07-04-043 so as to Not Force Residential Customers to Use Smart Meters.	Application 11-03-015 (Filed March 24, 2011) **(NOT CONSOLIDATED**
Application of Consumers Power Alliance, Public Citizen, Coalition of Energy Users, Eagle Forum of California, Neighborhood Defense League of California, Santa Barbara Tea Party, Concerned Citizens of La Quinta, Citizens Review Association, Palm Springs Patriots Coalition Desert Valley Tea Party, Menifee Tea Party - Hemet Tea Party – Temecula Tea Party, Rove Enterprises, Inc., Schooner Enterprises, Inc., Eagle Forum of San Diego, Southern Californians For Wired Solutions To Smart Meters, and Burbank Action For Modification of D.08-09-039 and A Commission Order Requiring Southern California Edison Company (U338E) To File An Application For Approval of A Smart Meter Opt- Out Plan.	Application 11-07-020 (Filed July 26, 2011) **(NOT CONSOLIDATED**

PACIFIC GAS AND ELECTRIC COMPANY'S RESPONSE TO ADMINISTRATIVE LAW JUDGE'S OCTOBER 18, 2011 RULING DIRECTING IT TO FILE CLARIFYING RADIO FREQUENCY INFORMATION

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PAGE # 28

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Pacific Gas and Electric Company for Approval of Modifications to its SmartMeter™ Program and Increased Revenue Requirements to Recover the Costs of the Modifications (U 39 M)	Application 11-03-014 (March 24, 2011)

PACIFIC GAS AND ELECTRIC COMPANY'S RESPONSE TO ADMINISTRATIVE LAW JUDGE'S OCTOBER 18, 2011 RULING DIRECTING IT TO FILE CLARIFYING RADIO FREQUENCY INFORMATION

I. INTRODUCTION

On October 18, 2011, Administrative Law Judge (ALJ) Yip-Kikugawa issued *Administrative Law Judge's Ruling Seeking Clarification* from Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), Southern California Edison Company (SCE) and Southern California Gas Company (SoCalGas) (collectively, the utilities or IOUs), in the above-captioned proceeding. Specifically, the Ruling directs the utilities to file clarifying information concerning the frequency and duration of radio frequency (RF) emissions from wireless smart meters by November 1, 2011. PG&E hereby timely responds to the Ruling.

II. PG&E'S SMARTMETERS™ COMPLY WITH FEDERAL COMMUNICATIONS COMMISSION (FCC) RADIO FREQUENCY (RF) EMISSIONS STANDARDS

PG&E's SmartMeters™ RF emissions are substantially below the Federal Communications Commission's (FCC) limits for radio transmitters of all types, including SmartMeters™. Indeed, and as PG&E noted in its Response to the Division of Ratepayer Advocates' *Motion to Amend the Scope of the Proceeding to Include Data on RF Emissions and to Order PG&E To Serve Supplemental Testimony on the Costs of an Analog Meter*, "the CPUC has previously found that PG&E's SmartMeters™ comply with FCC RF emissions standards. Specifically, the Commission found that '[a]ll radio devices in PG&E's SmartMeters™ are

licensed or certified by the FCC and comply with all FCC requirements.'[1] Further, the FCC itself has articulated that PG&E's SmartMeters™ comply with RF emissions levels."[2] (*See, PG&E's Opposition to DRA's Motion, p.3)(August 8, 2011*);(*see also, FCC letters, Attachments A and B*).

PG&E continues to recommend and support its proposed radio-off SmartMeter™ as the most feasible alternative to its SmartMeter™ Program, as fully described in Application (A.) 11-03-014 and supporting Testimony. PG&E's radio-off proposal provides an opt-out alternative with no wireless RF communications for customers who want to limit wireless telecommunications technology in their lives.

III. PG&E's RESPONSES TO THE CLARIFYING QUESTIONS IN THE OCTOBER 18, 2011 ALJ RULING

On September 14, 2011, ALJ Yip-Kikugawa held a combined workshop to consider alternatives for customers who may wish to opt-out of receiving wireless smart meters. During the workshop, various parties raised questions and made comments concerning the frequency and duration of the RF-transmissions from the wireless smart meters. The ALJ subsequently requested that the utilities respond to eleven RF-related questions as set forth below.

Each of PG&E's SmartMeter™ vendors – Silver Springs Network (SSN), General Electric (GE), Landis + Gyr (L+G), and Aclara – has confirmed that their SmartMeter™ products fully comply with applicable FCC regulations. PG&E's SmartMeter™ vendors provided the below RF-related data, as applicable to their respective products, in response to the ALJ Ruling.

---

1 CPUC Decision 10-12-001, Finding of Fact 2.

2 FCC Letters to Cindy Sage, dated August 6, 2010, and the Honorable Lynn C. Woolsey, dated April 21, 2011

Question 1:

What is an average duration (in seconds) that a residential smart meter transmits in a 24 hour period?

Response 1:

Electric: As PG&E has described many times previously, both in this proceeding and publicly, a typical PG&E electric SmartMeter™ communicates intermittently throughout the day for a total cumulative period of approximately 45 seconds per 24-hour period. This typical cumulative communication period is comprised of thousands of very brief communications.

This reflects the findings of a detailed SSN study in which SSN collected actual field data from 88,000 deployed meters and compared the number of transmissions per meter for roughly 30 minutes each in order to determine that half of the meters transmitted for less than 45 seconds-per-day and half of the meters transmitted for longer than 45 seconds-per-day. In the study, a small number of electric SmartMeters™ in the outer range of the population communicated somewhat longer than 45 seconds-per-day, which resulted in an overall mean duration of approximately 62 seconds.[3]

Gas: The PG&E gas SmartMeter Module (MTU) has a single radio that utilizes the licensed 450-470 MHz band. The module is a one way transmitter; i.e., it sends but does not receive signals. The average duration that a gas SmartMeter™ Module transmits in a 24-hour period is 0.676 seconds. This is a calculated value based on observed individual transmission rates of 0.16 seconds each, and the designed transmission frequency of between 4.15 and 4.35 transmissions per day.

Question 1.a.:

How is this average computed or measured?

Response 1.a.:

Electric: SSN supplies PG&E with the "chipset" contained in the electric SmartMeters™ that GE and L+G supply to PG&E. The chipset, referred to as a "Network Interface Card" or "NIC," processes and stores the data and provides the radio communication back to PG&E. SSN has conducted several studies on these data to compute the type and duration of these transmissions.

In the SSN study referenced in Response 1, SSN calculated the median transmission-time by collecting actual field data from 88,000 deployed meters. By checking the number of transmissions per meter for roughly 30 minutes each, SSN computed the length of these

---

[3] PG&E's electric SmartMeters™ have two radios installed: 1) a radio that utilizes the licensed 902-928 megahertz (MHz) band for connection to the PG&E back office, and 2) a 2.4 gigahertz (GHz) radio to transmit to devices in the customer premises. The transmissions measured and addressed in this Response relate to the 900 MHz radio. Currently, PG&E does not have any SmartMeters™ utilizing the 2.4 GHz radio.

transmissions per 24-hour day. In another study, SSN worked with PG&E to evaluate the transmissions of roughly 50,000 meters over a 48-hour period to similarly compute these numbers.

Gas: The duration of each transmission from the gas SmartMeter™ Module is less than 0.16 seconds. Using the typical transmission rate of 4.228 transmissions per 24 hours, the average duration over a 24-hour period is approximately 0.676 seconds (4.228 x 0.16 = 0.676).

Question 2:

How many times in total (average and maximum) is a smart meter scheduled to transmit during a 24-hour period?

Response 2:

Electric: Table 2-1 presents scheduled electric SmartMeter™ system messages and their durations. As noted in Response 1, the information presented applies only to the 900 MHz radio. Table 2-1 presents data for all "scheduled" messages; i.e., those inherently required to sustain communications in the network that occur routinely without user intervention. "Non-Scheduled" messages created only at non-recurring times are addressed in Response 3.

TABLE 2-1

Electric System Message Type	**Transmission Frequency Per 24-Hour Period: Average**	**Transmission Frequency Per 24-Hour Period: Maximum (99.9th Percentile)**
[a]	[b]	[c]
Meter Read Data	6	6
Network Management	15	30
Time Synch	360	360
Mesh Network Message Management	9,600	190,000
Weighted Average Duty Cycle	45.3 Seconds[4]	875.0 Seconds

The electric system message types are defined as:

- Meter Read Data refers to the messages generated by each meter to transmit energy usage data.
- Network Management refers to network tasks that need to be performed to maintain the health of the network (e.g., route establishment).
- Time Synch refers to network administration messages needed to update the internal clock in the NIC.
- Mesh Network Message Management refers to activities required to forward routed messages.

Gas: Table 2-2 presents scheduled gas SmartMeter™ system messages and their durations.

TABLE 2-2

Gas System Message Type	**Transmission Frequency Per 24-Hour Period: Average**	**Transmission Frequency Per 24-Hour Period: Maximum**
[a]	[b]	[c]
Meter Read Data	4.228	4.305
Weighted Average Duty Cycle	0.676 Seconds	0.689 Seconds

[4] As stated in Response 1, a small number of electric SmartMeters™ communicate somewhat longer than 45 seconds-per-day, which resulted in an overall mean duration of approximately 62 seconds.

Question 2.a.:
How many of those times (average and maximum) are to transmit electric usage information?

Response 2.a.:

Electric: Generally, the Meter Read Data messages shown in Table 2-1 transmit electric usage data from the meter generating the data. Mesh Network Message Management messages also transmit electric usage data from neighbor meters.

Gas: In Table 2-2, the Meter Read Data messages transmit gas usage data.

Question 2.b.:
How many of those times (average and maximum) are for other purposes? What are those other purposes? Please specify number of times (average and maximum) by type/category of transmission.

Response 2.b.:

Electric: The scheduled electric messages are shown in Table 2-1 and defined in Response 2. The Network Management and Time Synch messages are for administration and mesh maintenance, as explained in Response 2. They are required to sustain the routing capability of the mesh network.

Gas: There are no other standard messages than the usage data transmission.

Question 3:
Under what scenarios does a meter transmit outside of the daily schedule, i.e., unscheduled transmission such as on-demand read, tamper/theft alert, last gasp, firmware upgrade etc.?

Response 3:

Electric: For purposes of providing this data, PG&E is using data for all messages that inherently are required to sustain communications in the network, and occur routinely without user intervention as "scheduled"; messages created only at non-recurring times such as startup or to satisfy non-typical events or user requests are considered "non-scheduled".

Table 3-1 shows the categories of electric messages generated outside of the daily schedule. These messages are event-driven and are not predictable on any given day.

TABLE 3-1

Electric Message Type	Scenario
Interrogation for network (Initial)	Initial attempt to discover network availability or after an outage restoration
Interrogation for network (Extended)	Infrequent polling when network discovery is not immediate
Network Activation	Upon successful discovery of network route either upon initial startup or outage restoration
Last gasp	Upon loss of power
On-demand read	Request from PG&E back-office user
Firmware upgrade	Pushed from PG&E back-office user
Power status check	Request from PG&E back-office user
Other 'as-triggered' alarms	Sent as needed (e.g., power restored)
Meter disconnect or reconnect	Request from PG&E back-office user

Gas: The only unscheduled transmission would be for a tamper alarm. Tamper alarms are rare.

Question 4:
Typically, how much of the communication between the customer's meter and the utility is unscheduled vs. scheduled?

Response 4:

Electric: Typically, the majority of the communication between the customer's electric SmartMeter™ and PG&E is scheduled. SSN estimates that very little of the overall electric SmartMeter™ transmission time would be for unscheduled transmissions.

Gas: Aclara estimates that effectively 100 percent of the transmissions are due to scheduled activity. Tamper alarms are rare.

Question 5:
Are there any other factors that go into determining duration and/or frequency of meter transmissions (e.g., if a meter can't access the network when it's trying to send data, type of a meter etc.)? If yes, please identify these factors.

Response 5:

Electric: With respect to PG&E's electric SmartMeter™ system, there are no other factors that go into determining the duration or frequency of the electric meter system transmission other than those discussed in Responses 2 and 3.

Gas: With respect to PG&E's gas SmartMeter™ system, there are no other factors that go into determining the duration or frequency of the gas meter system transmission other than those discussed in Responses 2 and 3.

Question 6:
What is the amount of RF emission at the source when a meter is transmitting data (instantaneous maximum peak level, averaged over 30 minutes)?

Response 6:

Table 6-1 provides the requested data for electric SmartMeters™ and gas SmartMeter™ Modules.

TABLE 6-1[5]

Radio Type	Transmit Power	Antenna Gain (Decibel Isotropic)	Instantaneous Peak Level (Effective Isotropic Radiated Power)	Average Exposure Over 30 Minutes	Percent of FCC Allowable RF Emissions
[a]	[b]	[c]	[d]	[e]	[f]
Electric 900 MHz	1000 mW	4.0 dBi	2500 mW	0.35 μW/cm2	0.058%
Electric 2.4 GHz[6]	125 mW	None	125 mW	N/A	N/A
Gas Standard Module	132 mW	None	132 mW	0.01μW/cm2	0.0033%
Gas Extended Range Module	794 mW	None	794 mW	0.059μW/cm2	0.02%

[5] Average electric exposure has been calculated from duty cycles consistent with field observations at a distance of 20 centimeters. Average gas exposure has been calculated based on system specifications.

[6] As stated in Response 1, the 2.4 GHz radio is not currently in use in PG&E's SmartMeter™ system.

Question 7:
Does the amount of RF emission vary depending on duration of transmission/volume of data being sent? For example, are RF emissions higher when there is a larger volume of data to be transmitted?

Response 7:

Electric: While the power-level in PG&E's electric SmartMeters™ is fixed, the total RF energy varies based on the duration of the communication. When a larger volume of data is transmitted, the duration of the communication may increase, resulting in a greater emission of RF energy.

Gas: The usage read data messages are fixed in length and fixed in scheduled transmissions. Only tamper alarms are sent outside of scheduled transmissions. As noted earlier, tamper alarms are very rare.

Question 8:
Are there any other factors that impact the amount of RF emissions? If so, please identify the factor(s) and its impact on RF emissions.

Response 8:

Electric: PG&E is not aware of any other factors that affect the amount of RF emissions at the electric endpoint, i.e., at the customer's premises.[7]

Gas: PG&E is not aware of any other factors that affect the amount of RF emissions at the gas endpoint, i.e., at the customer's premises.[8]

---

7 PG&E notes that in addition to electric meters, there are network devices – generally mounted on PG&E distribution facilities at 25 feet or higher above the ground – called Relays or Access Points that receive the data from electric meters and forward the data over a public network cellular back haul (850 MHz or 1900 MHz) to the PG&E data center.

8 PG&E notes that in addition to gas meters, there are network devices – generally mounted on PG&E distribution facilities at 25 feet or higher above the ground – called Data Collection Units (DCUs) which receive the data from the gas SmartMeter™ Modules and forward the data over a public network cellular back haul (850 MHz or 1900 MHz) to the PG&E data center. The DCUs also send out one network administration message per day over the 450-470 MHz band.

Question 9:
Is there RF emission when the meter is not transmitting? If yes, what is the amount of RF emission?

Response 9:

Yes, all digital circuitry – from that contained in clocks, in stereo equipment, or in answering machines – emits de minimus RF that is governed by FCC limits for unintentional RF emissions.[9]

Table 9-1 provides the requested data for electric SmartMeters™ and gas SmartMeter™ Modules.

TABLE 9-1

Meter Type	RF Measured Value With Radio Off	FCC Allowable RF Emissions
[a]	[b]	[c]
Electric: GE	39.3 dBμV/m	49.0 dBμV/m
Electric: L+G	24.7 dBμV/m	49.0 dBμV/m
Gas: Aclara	No discernable emissions	40.0 – 54.0 dBμV/m

Electric: Note that PG&E's electric system communications equipment is installed inside of either of two SmartMeters™, one manufactured by GE and the other manufactured by L+G. Both of these meters are tested during meter certification testing and have been shown to emit de minimus RF when the SSN communications radio is turned off. The radio-off RF emissions are below FCC limits for unintentional RF emissions.

Gas: With respect to PG&E's gas SmartMeter™ Modules, there are no RF emissions when the Module is not transmitting.

[9] See Code of Federal Regulations, Title 47, Part 15, for a Class B digital device.

Question 10:

Is there a difference in the amount of RF emissions for a wireless smart meter with the radio off and a smart meter with the radio out? If yes, what is that difference and how is it calculated?

Response 10:

Table 10-1 provides the requested data for electric SmartMeters™ and gas SmartMeter™ Modules.

TABLE 10-1

Meter Type	RF Measured Value With Radio Out	RF Measured Value With Radio Off	FCC Allowable RF Emissions
[a]	[b]	[c]	[d]
Electric: GE	38.3 dBμV/m	39.3 dBμV/m	49.0 dBμV/m
Electric: L+G	31.3 dBμV/m	24.7 dBμV/m	49.0 dBμV/m
Gas: Aclara	No discernable emissions	No discernable emissions	40.0 – 54.0 dBμV/m

Electric: Both of PG&E's electric SmartMeter™ manufacturers test the meters without any communications radio installed during meter certification. The information provided in Table 10-1 reflects the measured values of the RF emissions from the electric SmartMeters™ with the radio out.

Note that the difference between the radio-out RF-emissions shown in Table 10-1 and the radio-off RF-emissions presented in Table 9-1 (and re-presented in Table 10-1 for comparison purposes) are de minimus.

Gas: With respect to PG&E's gas SmartMeter™ Modules, there are no discernable RF emissions when the radio is off.

Question 11:

Is there a difference in the amount of RF emissions for a wireless smart meter with the radio off and an analog meter? If yes, what is that difference and how is it calculated?

Response 11:

Electromechanical meters emit no RF. Therefore, there is a de minimus difference in RF between radio-off and an analog meter. Please also see PG&E's Response to Question 9.

IV. CONCLUSION

PG&E respectfully submits the requested clarifying information concerning the frequency and duration of RF emissions from its electric and gas SmartMeter™ technology.

Respectfully Submitted,

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Dated: November 1, 2011

EXHIBIT D

The following table is the number of Sacramento Municipal Utility District "smart" meter microwave transmissions. It may be viewed at their website, www.smud.org, specifically at page https://www.smud.org/en/residential/customer-service/smart-meters/common-questions.htm

Electric system message type	Transmission frequency per 24-hour period: Average	Transmission frequency per 24-hour period: Maximum (99.9th percentile)
Meter read data	6	6
Network management	15	30
Time sync	360	360
Mesh network message management	13,000	240,000
Weighted average duty cycle	61.4 seconds	1,262 seconds

EXHIBIT E

MICRO WAVE NEWS

A Report on [redacted]

The Real Junk Science of EMFs: Stop Electric Field Cancer Research, Say Industry Scientists

November 23, 2009

A decade after some of the world's leading epidemiologists agreed that exposure to power line EMFs could lead to childhood leukemia, the denial continues. Some people still believe that the studies that link EMFs to cancer are nothing more than junk science. Even those who should know better refuse to acknowledge the risks. The World Health Organization (WHO) says the association is so weak that it can be pretty much ignored, and the leading radiation protection group, ICNIRP, has refused to endorse precaution. Here in the U.S., the Environmental Protection Agency (EPA) scarcely acknowledges that EMFs are even a health issue.

As a result, money for research has dried up, and any number of promising avenues that might have moved the issue forward remains unexplored.

How did this happen? The answer has a lot to do with junk science, but not the kind often associated with EMFs. No one would deny that the EMF literature is studded with poor studies —those that claim to show effects that can't be repeated. This happens with EMFs, as well as all other types of research. In this case, we are referring to industry's own brand of junk science that promotes misinformation and confusion and presents a distorted picture of

EMF science.

The story that follows illustrates how electric utilities play the junk science game. It shows how two of its long-time operatives are corrupting the EMF literature. Leeka Kheifets and John Swanson, together with two utility associates, are calling for an end to research on the links between power-line electric fields and cancer.

In a paper that will appear in the February 2010 issue of *Bioelectromagnetics*, Kheifets and Swanson argue that studies on electric fields and cancer have come to a dead end and that its time to close the book on them. There is "little basis for continued research," they claim. In fact, it is just the opposite. Epidemiologic studies on electric field effects on workers have produced some of the most provocative findings in the entire EMF cancer literature. This work has been ignored for years and now Kheifets and Swanson want to bury it for good.

A Brief History of Electric Field Occupational Studies

Kheifets and Swanson are industry scientists. Kheifets spent the bulk of her professional career at EPRI, the electric utility research group, and now serves as a freelance consultant. Swanson works for National Grid, a huge electricity delivery company that operates in the U.K. and the U.S. Their new paper was bought and paid for by Energy Networks Association (ENA), a U.K. power-line trade group. On its Web site, the ENA states, "The overall case that power-frequency electric fields are causally linked to human cancer ... can reasonably be called non-existent."

To support the ENA position, Kheifets and Swanson offer a review of the electric field literature that is astonishingly brief. All the laboratory and animal studies are covered in a single paragraph that runs little more than 100 words. The heart of their new paper is about the epidemiology: studies of people who have been exposed to electric fields at home and at work. The residential studies, they concede, don't tell us very much. Their entire argument to stop research boils down to just one set of studies —those of workers exposed to electric fields on the job. There are only six of them.

Much of the concern over EMFs began in the early 1970s when reports came out of the Soviet Union that workers in electrical substations were suffering from numerous health problems, everything from heart palpitations and sexual dysfunction to general irritability and loss of appetite. The Soviets blamed electric

fields and most of the follow-up studies —here and there— focused on those types of EMFs. That all changed in 1986 when David Savitz repeated Nancy Wertheimer and Ed Leeper's landmark study linking childhood leukemia to magnetic fields. Almost overnight, electric fields were written off as everyone's attention shifted to magnetic fields. This went on for the next ten years, and then in 1996, Tony Miller of the University of Toronto brought electric fields back into play, if only very briefly.

In a major epidemiological study of electric utility workers, Miller found that when he took into account exposures to both electric *and* magnetic fields, he saw a much higher risk of developing leukemia than when he looked at magnetic fields alone: He reported increases that were up to 11 times the expected rate. "This study suggests that electric fields are potentially critical to cancer risk," Miller told *Microwave News* at the time (see *MWN*, J/A96, p.1).

Miller's study was part of a joint Canadian and French project. Later that year, the leaders of the French team, Marcel Goldberg and Pascal Guénel of the National Institute of Health and Medical Research (INSERM) in Paris, reported that, while they did not see a leukemia risk, they did find an up to sevenfold increase in brain cancer among those exposed to electric-fields for 25 years or more. This association, they said, was "remarkable" (*MWN*, J/F97, p.4).

Miller's findings caused a stir when they were published. "It's alarming," the head of the Power Workers' Union told a Canadian newspaper. He called "for immediate employer and government action to protect workers." Ruth Greey of Ontario Hydro, the local electric utility whose employers had been surveyed by Miller, tried to calm everyone down by promising more research on electric fields, and urging patience until Miller's results could be confirmed. "We would be irresponsible at this point to change anything or alarm anyone until the study is replicated," she said. EPRI issued its own statement stating, "further studies are needed."

Ontario Hydro never did a replication study. Neither did EPRI. Instead, Kheifets, then an EPRI project officer, embarked on a much cheaper —and meaningless— effort to take the heat off electric fields. Her plan involved resurrecting some old data to discredit Miller's findings. A few years earlier, Kheifets had managed an epidemiological study of leukemia among electrical workers under the direction of John Peters and Stephanie London at the University of Southern California (USC) in Los Angeles.

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Because it was an EPRI project, she had free access to the USC study files.

Kheifets had to overcome a major problem: The USC researchers had done a magnetic field not an electric field study. They had relatively few electric-field measurements —for only about a quarter of their study population. They did not have a single measurement for power line workers, the group with the highest exposures. All in all, Kheifets had electric field information for just *six* utility employees. In contrast, Miller's team had sampled electric and magnetic field levels for 260 unique job titles at 140 different electric utility sites.

Kheifets moved forward regardless. She published a three-and-a-half-page paper in 1997, claiming that there is "little support for an association between occupational electric field exposure and leukemia." There could be no doubt that this paper was her brainchild. She herself was the lead author —not Peters or London, the principal investigators on the original project. The USC magnetic field paper, published three years earlier, ran 16 pages and had eight authors; Kheifets was not among them.

The Kheifets-USC study was industry's last word on electric fields —that is, until this summer when she and Swanson called for research to stop. The Canadians, on the other hand, carried on. Paul Villeneuve, a graduate student working on his doctoral thesis at the University of Ottawa, took a second look at Miller's data. He found that workers exposed to high electric fields for many years suffered what he called "dramatic increases in leukemia." Writing in the June 2000 issue of the *American Journal of Industrial Medicine*, Villeneuve reported that those who had worked for Ontario Hydro for at least 20 years in electric fields that were often above 10-20 V/m had up to ten times more leukemia. In a second paper published at about the same time in *Occupational and Environmental Medicine*, he noted elevated risks of non-Hodgkin's lymphoma among the same group of workers exposed to high electric fields.

Villeneuve's papers are significant for two reasons. First, they emphasized once again the urgency of investigating electric fields, not just magnetic fields, as Miller had recommended four years earlier. David Savitz, then chairman of the department of epidemiology at the University of North Carolina School of Public Health, told *Microwave News* at the time that Villeneuve's results prompt the need to take a fresh look at electric fields (see *MWN,*

M/J00, p.1).

Second, Villeneuve showed how new measures of classifying exposure could clarify cancer risks. Up to that time, epidemiologists had rarely looked beyond simple average field levels. Many had seen elevated cancer rates, but the increases were generally not that big. Now by separating out those workers whose exposures exceeded certain thresholds for many years, much higher risks emerged. Villeneuve's hypothesis makes intuitive sense: Those exposed to higher doses would be at greater risk. In retrospect, it seems all too obvious, but no one had yet tested the idea. (A short time later, De-Kun Li at Kaiser Permanente in California, using a related exposure index for magnetic fields, saw a link to miscarriages among women exposed above a certain threshold (16 mG), see *MWN,* M/J01, p.1. After Villeneuve, no one would again investigate thresholds in an EMF-cancer study.

Stacking the Data

Of the six occupational studies reviewed by Kheifets and Swanson, four came from the same Canadian-French project of electric utility workers. All four point to unprecedented increases in leukemia, lymphoma and/or brain cancer.

The fifth is an epidemiological study of Norwegian railroad workers. Its relevance is questionable. Norwegian railways operate at 16⅔ Hz, while U.S. and European electrical systems operate at 60 Hz and 50 Hz respectively. Kheifets and Swanson neglect to mention this inconvenient fact. Another important omission: The Norwegians did not actually measure worker exposures to electric fields. Writing in the *American Journal of Epidemiology* in 1994, Tore Tynes's team cautioned that their estimates of electric field exposures were not reliable.

The sixth and last paper was Kheifets's own analysis of the meager USC electric field data. Joe Bowman, an industrial hygienist now at NIOSH in Cincinnati, was responsible for the USC measurements. When recently asked to compare the USC study to Miller's, he replied: "The study designs are not in the same league; Miller's is far superior. To claim that Miller's findings were not replicated on the basis of my data is ridiculous."

Bowman explained that it is "very difficult" to measure electric-field exposures, because the very presence of the workers can distort the ambient fields. Kheifets and Swanson acknowledge this

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problem but use it selectively to try to discredit the meter —the Positron— used in the Canadian-French project. "[A]n association reported in these but not other studies is highly unlikely due to more accurate measure of exposure," Kheifets and Swanson write. Given that there was a total of only six measurements of electrical utility workers in those "other studies" —those by Tynes and Kheifets herself— their argument is, to be blunt, absurd.

The Positron meter was designed by Paul Héroux when he was working for IREQ, the research arm of Hydro-Québec, in the 1980s. Héroux, who is now at McGill University's medical school, rejects Kheifets-Swanson's criticism. "Exposures based on Positron electric field measurements are more precise, even when perturbed by the body, than those based on unperturbed spot measurements," he told *Microwave News* this fall. "There is inevitable inaccuracy in any form of exposure assessment, but dosimeters provide the best estimates." Bowman agrees. "In reality, the Positron studies are the best ever electric field studies of utility workers," he said.

Héroux reserves his most damning criticism for Kheifets and Swanson's abuse of their positions as technical experts. "They are providing a twisted view of measurement methods in a way can only be interpreted as favoring a political agenda," he said. "It would appear that they want to belittle scientific data that their employers find embarrassing."

Bowman, Héroux, Miller and Villeneuve all say that research on electric fields should have continued. Miller, who retired in 1996, is back at the University of Toronto, where, as the associate director for research at its School of Public Health he hopes to stimulate increased collaborative research on environmental issues, including EMFs. "I am disappointed that other people did not follow through and repeat my study," he said in a recent interview. "It needs to be pursued. It definitely needs to be pursued."

Villeneuve, who now works for Health Canada in Ottawa, strongly agrees. "The magnitude of the risk and the accompanying dose-response we found are very provocative," he told *Microwave News* not long ago. "Further research should be done."

There is nothing surprising about researchers wanting others to follow in their footsteps, but to hear such unanimous and passionate calls for replication so many years later is remarkable.

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Junk Science in Demand

The Miller-Villeneuve studies are arguably the most important in the EMF occupational literature. They have long demanded more serious attention and might not have been ignored if members of the EMF community —indeed, anyone— had spoken out for public health. In the mid-1990's, when she was at EPRI, Kheifets was one of the few people in America who was in a position to fund a replication effort. Instead, she published a junk paper and dressed it up as a refutation. Now she and Swanson are trying to use that same paper to finish the job.

Actually, Kheifets and Swanson's paper is worse than junk science, it's fraud. The paper seeks to give the electric industry a major prize by taking electric fields off the EMF health agenda. This is, by any reasonable definition, scientific misconduct, and is far more serious than any of the cases that have been pursued by those who police scientific integrity (see "Three Cases of Alleged Scientific Misconduct").

Far from ever being challenged, Kheifets has been and continues to be in great demand. She has helped shape every major EMF risk evaluation in recent memory. Swanson has been invited to attend many of the same meetings.

ICNIRP, which touts itself as being free of industry ties, has had Kheifets on its Standing Committee on Epidemiology for the last seven years. The committee publishes influential literature reviews on health risks, including the possible links between power lines and cancer.

Back in 2001, IARC, the International Agency for Research on Cancer, though fully aware that Kheifets worked for EPRI, invited her to sit on its committee evaluating EMF cancer risks as a full voting member. IARC also welcomed Swanson to sit in as an observer. According to those who were at the meeting, Swanson participated in the deliberations no differently that he would have as a member of the committee.

Soon afterwards Kheifets joined Mike Repacholi at WHO's EMF Project in Geneva. EPRI continued to support her while she was at the WHO, even though this was in apparent violation of WHO rules governing conflicts of interest (see our August 9, 2005 post). One of Kheifets's responsibilities at WHO was helping Repacholi write and coordinate what would become the organization's official

position on power-line health risks, a document known as the Environmental Health Criteria. In the fall of 2005, Kheifets and Repacholi invited eight observers to attend a meeting where the final conclusions would be hammered out. All eight had close ties to the electric utility industry (see "WHO Welcomes Electric Utility Industry To Key EMF Meeting,").

Swanson was one of the eight invited guests at the WHO meeting. Another was Michel Plante, a medical doctor at Hydro-Québec, a Canadian utility with headquarters in Montreal. Plante had been the manager of a third component of the same Canadian-French project that produced the Miller, Villeneuve and Goldberg-Guénel electric-field cancer papers. Gilles Thériault of McGill University was the leader of this part of the project. Like his co-investigators, Thériault uncovered highly credible and significant cancer risks among workers at Hydro-Québec, but in this case, he implicated a different type of EMF, high-frequency transients sometimes referred to as dirty electricity. (The Positron meter can also measure these fields.)

Thériault's study was the first to link transients to cancer and, like the project's studies on electric fields, threatened to open a new front in EMF research. Hydro-Québec moved quickly to block it. With Plante's help, the utility forced McGill to return the all the information he had collected on the utility workers and their EMF exposures. Thériault was never allowed to see the data again.

None of the papers from the Canadian-French project that implicate electric fields or transients —those by Miller, Villeneuve, Goldberg-Guénel and Thériault— are cited in WHO's EMF Environmental Health Criteria document. It is as if those studies never happened.

Time To Speak Out and Take Action

Mike Repacholi, the former head of both ICNIRP and the WHO EMF Project, likes to reassure his critics that he has always been guided by the science and only the science. "Throughout my time at the WHO I can say unreservedly that all decisions were based on the science by committees of experts," he said in an interview not long after his retirement. Paolo Vecchia, the current chair of ICNIRP, professes to be similarly moved. "Restrictions [on EMF exposures] are based on science: Only established effects are considered," he told a London conference organized by the U.K. Radiation Research Trust last year.

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It's a hard sell. The WHO EMF Project would never have existed without the backing of industry money. In return, Repacholi opened his doors to industry so that its people could have a seat at the table and help shape the reports coming out of Geneva. When he needed an assistant to help him run the project, he again turned to industry, hiring Kheifets from EPRI. Similarly, Vecchia appears to have no qualms about having Kheifets sit on one of ICNIRP's key expert committees. (See also "Repacholi and Sound Science" and "WHO and Electric Utilities: A Partnership on EMFs".)

The history of electric field epidemiology shows how easy the science can be manipulated. Important studies are paid lip service, and then never repeated. Sometime later, they are buried away. Effects can never be established and acted upon if they are ignored and misrepresented. Those that are successfully repeated are endlessly questioned. The childhood leukemia link has been forever marginalized. There is no mechanism and because we can't explain it, it can't be true, so goes Repacholi's, Vecchia's, Kheifets's and Swanson's argument. What gets lost is that if EMFs can bring on childhood leukemia, it may lead to other types of cancer too, perhaps by some other mechanism. If it's not impossible for childhood leukemia, other nasty things may follow too.

All this hypocrisy is not lost on those who are left outside looking in. Discontent and contempt are widespread. This led to the founding of ICEMS to promote research and assess health risks. ICEMS is designed to serve as a counterweight to the WHO and ICNIRP. A number of its members put together the BioInitiative Report, an alternative interpretation, of the EMF health literature. On a lighter note, last summer, activists translated their frustrations into satire: They circulated a promo for "ICNIRP in Concert," a mock CD. "Would I Lie to You?" was among the promised songs. It was a huge hit on the EMF circuit.

Distorting the public health literature is not a victimless crime. Workers who will be exposed to higher EMFs will have, according to Miller and Villeneuve, a tenfold greater cancer risk than if precautions were to be taken. Kheifets and Swanson's fraud is no different from that which helped suppress the cancer risks of cigarette smoke, asbestos and many, many chemicals. Yet these industry scientists continue to be welcomed at the highest levels as fair and balanced experts.

Why doesn't anyone speak out against the corruption in their

midst? Over the last few years, Germany's Alex Lerchl has made a career out of demanding that Hugo Rüdiger be punished for scientific misconduct, which has never been substantiated (see "Three Cases of Alleged Scientific Misconduct"). When we asked Lerchl about his motives some time ago, he replied, "I don't like rubbish being published." On that we can agree. But why then isn't he —or anyone else— up in arms against Kheifets and Swanson's electric field rubbish? Why are industry scientists never held to account for their actions, even as they pursue others whose crimes are petty in comparison? Perhaps because the work of those other scientists challenges industry's interests. The playing field is far from fair.

It's time for industry scientists to be held to the same standards and suffer the same penalties as they would apply to others. At the very least, those who deceive through scientific misconduct should no longer be able to receive government research grants or sit on advisory and peer review panels.

EMFs will never be taken seriously as long as no one is willing to acknowledge the real junk science in our midst.

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Louis Slesin, the editor of *Microwave News,* has published a "Comment" on the Kheifets-Swanson call to stop electric field research. It appears in the same February 2010 issue of *Bioelectromagnetics* as their paper. Kheifets and Swanson declined to respond to Slesin's charge that their paper was "little more than industry disinformation."

Leeka Kheifets, John Swanson, electric fields, Bioelectromagnetics, Michael Repacholi, cell phones, WHO, ICNIRP, EPA, cancer, EMF Project, Alexander Lerchl,

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